

Plant and Equipment Expenditures by Business for Pollution Abatement, 1973-80, and Planned 1981

THIS article presents expenditures in 1980 and planned expenditures for 1981 for new plant and equipment to abate air and water pollution and to dispose of solid waste based on a BEA survey in late 1980. It also presents revised estimates for 1973-79 that incorporate coverage and statistical improvements (chart 4). Highlights are:

- Business plans a 9-percent increase in pollution abatement (PA) capital spending in 1981, the same increase as in 1980.
- Prices of PA capital goods as measured by the implicit price deflator increased 10 percent in 1980.
- Real spending decreased 1 percent in 1980. Business plans indicate a similar decrease in real spending in 1981 if prices increase at the 1980 rate.
- The average annual increase in the revised series for 1973-79 is larger than in the previously published series—9 percent compared with 5

percent. The estimate for 1973 was revised down; estimates for other years were revised up.

Pollution abatement is the reduction or elimination of emissions of pollutants that is brought about by human activity directed to that purpose. Disposal of solid waste refers to the collection and disposal of solid waste by means acceptable to Federal, State, and local authorities. Part of expenditures for disposal of solid waste is not for PA, but its exclusion is not attempted at the level of detail in this article.¹

The universe estimates presented are for capital expenditures by nonfarm nonresidential business, excluding expenditures for emission abatement devices on cars and trucks.² These estimates are based on sample data from companies, each of which is assigned to the industry corresponding to the company's principal product. (See Technical Note 1 for a description of the survey methodology.)

Survey results: 1980 and planned 1981

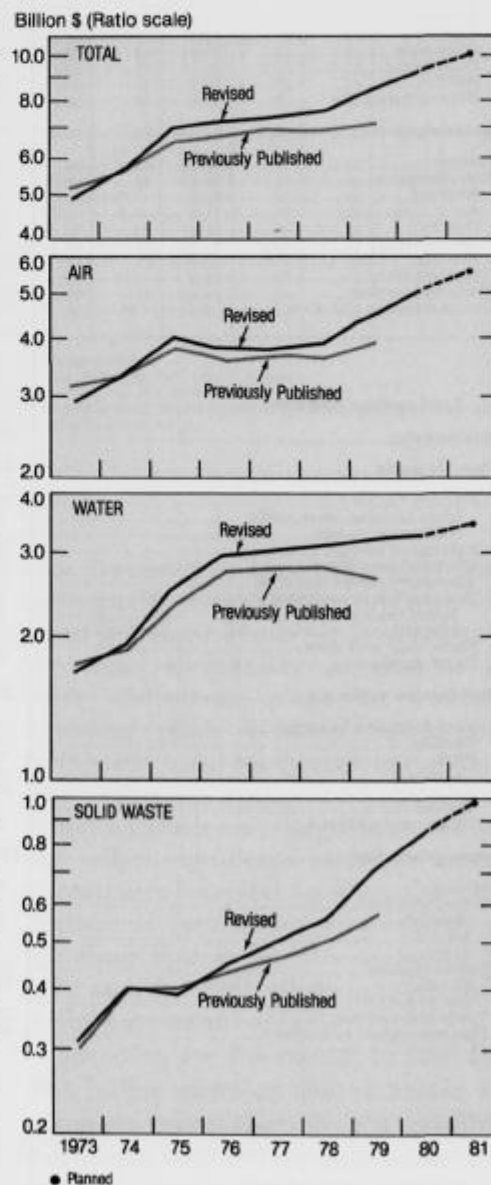
Business spent \$9.2 billion in 1980 for new plant and equipment to abate air and water pollution and to dispose of solid waste—a 9-percent increase from 1979. Business plans another 9-percent

1. For further discussion of pollution abatement and solid waste disposal, see John E. Cremeans, "Conceptual and Statistical Issues in Developing Environmental Measures—Recent U.S. Experience," *Review of Income and Wealth*, ser. 23 (June 1977): 97-115, and Gary L. Rutledge and Susan L. Trevathan, "Pollution Abatement and Control Expenditures, 1972-79," *SURVEY OF CURRENT BUSINESS* 61 (March 1981): 19-27.

2. For expenditures by business for emission abatement devices on cars and trucks, see Rutledge and Trevathan, "Pollution Abatement," p. 20.

NOTE.—Publication of the revised estimates for 1973-79 completes a 3-year project by the Environmental and Nonmarket Economics Division. Gary L. Rutledge, Chief of the Abatement and Control Expenditures Branch, directed the project. Betsy D. O'Connor developed specifications for computer programs, performed most of the reediting and other production tasks, coordinated work by others—William J. Russo, Jr., Kit D. Farber, Howard J. White, and Tracy K. Leigh—and contributed to the article. George R. Green, Marie P. Hertzberg, and John T. Woodward, of the Business Outlook Division, contributed significantly to the formulation of the revision project and provided staff support for reediting and processing. Colin B. Brown, Maurice A. Schlak, and Lisa K. Westerback, of the Computer Systems and Services Division, provided computer assistance.

CHART 4
New Plant and Equipment Expenditures for Pollution Abatement



U.S. Department of Commerce, Bureau of Economic Analysis

81-6-4

Table 1.—New Plant and Equipment Expenditures by U.S. Nonfarm Business: Total and for Pollution Abatement

[Billions of dollars]

	1973					1974					1975				
	Total ¹	Pollution abatement				Total ¹	Pollution abatement				Total ¹	Pollution abatement			
		Total	Air	Water	Solid waste ²		Total	Air	Water	Solid waste		Total	Air	Water	Solid waste
Total nonfarm business.....	137.79	4.32	2.82	1.59	0.33	156.98	5.78	3.37	1.93	0.48	157.71	6.97	4.03	2.58	0.36
Manufacturing.....	42.37	3.10	1.83	1.09	.18	53.21	2.74	2.34	1.83	.35	54.92	4.33	2.75	1.94	.21
Durable goods.....	22.75	1.45	1.02	.37	.07	27.44	1.53	1.33	.43	.09	28.33	1.90	1.28	.63	.09
Primary metals ³	8.00	.03	.52	.00	.02	4.81	.74	.55	.15	.09	5.51	1.02	.76	.28	.05
Blast furnaces, steel works.....	1.25	.19	.13	.05	(*)	1.84	.23	.17	.07	.01	3.02	.43	.28	.14	(*)
Nonferrous metals.....	1.20	.28	.32	.03	.01	2.05	.43	.34	.00	.02	2.17	.62	.41	.07	.04
Fabricated metals.....	1.51	.09	.05	.02	(*)	1.84	.10	.07	.02	(*)	1.97	.13	.07	.06	(*)
Electrical machinery.....	2.80	.13	.05	.05	.01	3.55	.12	.05	.00	(*)	3.14	.00	.05	.03	.01
Machinery, except electrical.....	2.97	.09	.05	.04	.01	5.23	.09	.04	.01	.01	4.96	.00	.04	.04	.01
Transportation equipment ⁴	6.06	.23	.11	.08	.03	8.50	.19	.09	.06	.03	5.92	.15	.07	.07	.02
Motor vehicles.....	3.83	.10	.08	.08	.02	4.50	.14	.00	.08	.03	2.35	.10	.04	.04	.02
Aircraft.....	.87	.04	.02	.02	(*)	1.51	.04	.02	.02	(*)	1.68	.06	.08	.02	(*)
Stone, clay, and glass.....	1.58	.15	.13	.03	(*)	1.63	.21	.10	.02	(*)	1.66	.22	.18	.08	(*)
Other durables ⁵	3.23	.18	.10	.05	.01	2.41	.18	.11	.07	.01	2.88	.10	.10	.08	.01
Non-durable goods.....	19.42	1.62	.82	.72	.11	25.78	2.12	1.96	.21	.15	26.59	3.03	1.46	1.42	.15
Food including beverage.....	3.82	.34	.09	.13	.02	4.03	.25	.06	.15	.02	4.02	.29	.09	.17	.02
Textiles.....	1.32	.44	.41	.03	(*)	1.09	.05	.02	.02	(*)	.90	.05	.02	.02	(*)
Paper.....	1.00	.31	.17	.12	.01	2.69	.38	.24	.13	.01	2.08	.50	.27	.21	.02
Chemicals.....	4.24	.49	.18	.22	.06	6.47	.56	.24	.30	.03	7.03	.83	.41	.47	.04
Petroleum.....	4.66	.64	.33	.18	.03	7.31	.78	.41	.29	.08	9.48	1.27	.71	.60	.09
Rubber.....	1.55	.04	.02	.02	(*)	1.47	.03	.03	.02	(*)	1.18	.05	.03	.03	(*)
Other non-durables ⁶	2.61	.04	.02	.01	(*)	2.39	.05	.04	.01	.01	2.32	.05	.03	.02	.01
Nonmanufacturing.....	95.33	1.81	1.99	.59	.13	193.73	1.96	1.39	.48	.15	192.79	2.64	1.27	.61	.16
Mining.....	3.31	.14	.06	.07	.01	4.62	.14	.07	.08	.01	6.10	.14	.06	.00	.02
Transportation.....	7.41	.04	.02	.03	(*)	8.23	.10	.04	.05	.01	8.08	.11	.04	.05	.01
Railroad.....	2.35	.02	.01	.01	(*)	2.70	.03	.02	.02	(*)	2.88	.04	.01	.02	(*)
Air.....	2.00	.01	.01	(*)	(*)	1.94	.01	(*)	(*)	(*)	1.02	.01	(*)	(*)	(*)
Other.....	3.17	.02	.01	.01	(*)	3.58	.06	.02	.03	.01	4.16	.06	.02	.03	.01
Public utilities.....	17.47	1.32	.22	.42	.07	16.93	1.47	.34	.43	.06	19.35	1.51	1.01	.41	.08
Electric.....	15.00	1.25	.31	.41	.07	16.04	1.45	.33	.42	.06	16.05	1.47	1.00	.39	.08
Gas and other.....	2.47	.06	.01	.02	(*)	3.19	.04	.02	.02	(*)	3.30	.04	.01	.03	(*)
Trade and services.....	45.33	.23	.12	.18	.04	47.79	.38	.09	.05	.04	46.22	.21	.11	.00	.03
Communication and other ⁷	21.12	.06	.07	.01	(*)	23.30	.09	.05	.01	(*)	21.50	.08	.06	.03	.04
	1976					1977					1978				
	Total ¹	Pollution abatement				Total ¹	Pollution abatement				Total ¹	Pollution abatement			
		Total	Air	Water	Solid waste ²		Total	Air	Water	Solid waste		Total	Air	Water	Solid waste
Total nonfarm business.....	171.46	7.24	3.51	2.97	0.46	186.06	7.34	3.39	2.44	0.50	231.24	7.55	3.31	3.11	
Manufacturing.....	49.95	4.53	2.33	2.21	.29	59.22	4.65	3.14	2.22	.38	75.73	4.44	2.28	1.56	.32
Durable goods.....	28.47	1.75	1.11	.59	.07	34.84	1.75	1.40	.49	.10	40.43	1.74	1.06	.59	.12
Primary metals ³	5.73	.09	.71	.27	.01	5.45	.09	.00	.23	.02	5.74	.79	.50	.21	.02
Blast furnaces, steel works.....	3.04	.49	.30	.19	(*)	2.79	.30	.19	.15	.02	2.52	.46	.30	.14	.01
Nonferrous metals.....	1.97	.41	.35	.07	.01	1.88	.34	.24	.06	.01	2.11	.25	.16	.06	.01
Fabricated metals.....	2.32	.08	.04	.03	(*)	2.48	.09	.04	.05	(*)	2.58	.06	.03	.03	(*)
Electrical machinery.....	3.68	.09	.04	.04	.01	4.57	.11	.04	.05	.01	5.09	.10	.04	.06	.01
Machinery, except electrical.....	5.24	.09	.04	.04	.01	6.38	.12	.05	.06	.01	7.21	.13	.07	.06	.01
Transportation equipment ⁴	6.30	.17	.07	.07	.03	9.06	.23	.08	.10	.04	12.03	.26	.12	.11	.03
Motor vehicles.....	5.02	.10	.03	.06	.02	4.82	.17	.06	.07	.04	7.23	.23	.10	.08	.04
Aircraft.....	1.09	.05	.04	.02	(*)	2.01	.05	.02	.02	(*)	3.22	.04	.02	.02	.01
Stone, clay, and glass.....	1.87	.15	.12	.06	.01	2.24	.16	.11	.04	.01	3.10	.23	.15	.06	.01
Other durables ⁵	2.06	.21	.00	.12	.04	3.44	.17	.06	.10	.01	2.80	.14	.06	.08	.01
Non-durable goods.....	31.47	3.05	1.22	1.61	.21	35.38	2.87	1.15	1.53	.26	34.29	2.79	1.21	1.23	.29
Food including beverage.....	4.80	.26	.10	.17	.02	5.12	.25	.09	.15	.02	5.97	.34	.13	.18	.03
Textiles.....	1.53	.04	.01	.03	(*)	1.28	.04	.02	.03	(*)	1.38	.04	.02	.02	(*)
Paper.....	3.11	.46	.17	.30	.01	3.60	.43	.15	.25	.03	3.09	.29	.13	.14	.02
Chemicals.....	8.13	.87	.37	.55	.00	8.14	.83	.34	.54	.05	8.40	.73	.31	.27	.05
Petroleum.....	10.77	1.18	.53	.53	.12	13.90	1.13	.30	.53	.08	13.95	1.20	.55	.54	.09
Rubber.....	1.31	.04	.08	.02	(*)	1.65	.06	.04	.02	.01	2.10	.07	.05	.01	(*)
Other non-durables ⁶	2.32	.02	.03	.01	(*)	2.72	.03	.01	.01	(*)	3.48	.04	.01	.02	.01
Nonmanufacturing.....	111.54	2.40	1.48	.78	.16	126.87	2.69	1.45	.83	.25	161.52	3.14	1.46	1.24	.24
Mining.....	7.44	.23	.11	.09	.02	9.34	.35	.10	.10	.06	10.21	.42	.13	.24	.05
Transportation.....	8.89	.11	.04	.06	(*)	9.40	.05	.03	.05	.01	10.68	.11	.04	.05	(*)
Railroad.....	2.87	.02	.02	.02	(*)	3.03	.04	.01	.03	(*)	3.45	.04	.01	.03	(*)
Air.....	1.16	.01	.01	(*)	(*)	2.17	.01	(*)	(*)	(*)	3.09	.02	(*)	(*)	(*)
Other.....	4.86	.06	.02	.03	.01	4.20	.04	.02	.02	(*)	4.10	.06	.02	.03	.01
Public utilities.....	22.37	1.51	.16	.53	.00	28.70	2.14	1.43	.61	.11	29.05	1.37	.83	.15	.15
Electric.....	19.75	1.70	.17	.51	.00	22.13	2.12	1.43	.59	.11	24.43	2.35	1.36	.34	.13
Gas and other.....	3.62	.04	.02	.02	(*)	4.56	.04	.05	.02	(*)	5.22	.04	.01	.02	(*)
Trade and services.....	49.30	.21	.11	.07	.03	64.54	.18	.07	.05	.02	63.05	.18	.00	.07	.03
Communication and other ⁷	22.61	.04	.03	.01	(*)	28.95	.03	.02	.01	(*)	31.02	.04	.03	.01	(*)

See footnotes at end of table.

Table 1.—New Plant and Equipment Expenditures by U.S. Nonfarm Business: Total and for Pollution Abatement—Continued

(Billions of dollars)

	1979					1980					Planned 1981				
	Total ¹	Pollution abatement				Total ¹	Pollution abatement				Total ¹	Pollution abatement			
		Total	Air	Water	Solid waste		Total	Air	Water	Solid waste		Total	Air	Water	Solid waste
Total nonfarm business.....	270.46	8.41	4.58	3.21	0.71	325.63	8.38	5.07	3.38	0.93	334.72	10.00	5.67	3.45	0.98
Manufacturing.....	95.45	4.32	2.56	1.84	.43	116.81	5.63	2.88	2.04	.55	129.85	6.34	3.36	2.44	.64
Durable goods.....	51.87	2.00	1.21	.88	.14	58.91	2.27	1.42	.69	.15	65.47	2.46	1.47	.89	.21
Primary metals ²	6.76	.92	.64	.28	.02	7.71	.96	.67	.24	.04	8.30	1.11	.79	.28	.07
Blot furnaces, steel works.....	3.06	.62	.43	.19	.01	3.29	.61	.41	.19	.01	3.27	.60	.40	.10	.02
Nonferrous metals.....	2.30	.21	.14	.06	.01	3.11	.27	.17	.07	.03	3.50	.28	.22	.08	.05
Fabricated metals.....	3.85	.07	.83	.04	(*)	2.86	.07	.02	.03	.01	3.25	.83	.83	.03	.04
Electrical machinery.....	7.28	.11	.08	.00	.01	8.39	.16	.07	.06	.02	12.06	.23	.11	.00	.03
Machinery, except electrical.....	10.62	.14	.07	.06	.01	11.20	.15	.07	.07	.04	13.88	.19	.02	.08	.01
Transportation equipment ³	15.82	.41	.19	.16	.05	16.16	.52	.35	.17	.04	19.18	.44	.19	.20	.07
Motor vehicles.....	8.30	.31	.15	.11	.05	9.06	.28	.25	.12	.02	8.10	.20	.18	.13	.03
Aircraft.....	3.57	.07	.03	.03	.01	7.03	.19	.04	.04	.02	7.62	.15	.05	.05	.02
Stone, clay, and glass.....	2.94	.21	.17	.03	.01	3.82	.23	.21	.03	.01	3.90	.24	.21	.04	.02
Other durables ⁴	4.22	.16	.06	.06	.04	5.09	.14	.07	.06	.01	5.91	.17	.09	.06	.02
Non-durable goods.....	42.61	2.32	1.34	1.19	.59	55.94	3.35	1.46	1.44	.44	63.38	2.84	1.80	1.61	.43
Food including beverages.....	4.42	.27	.03	.16	.03	7.39	.27	.08	.16	.02	7.92	.30	.10	.16	.03
Textiles.....	1.50	.06	.03	.02	(*)	1.62	.07	.05	.02	(*)	1.72	.08	.05	.03	(*)
Paper.....	5.55	.40	.19	.18	.05	6.80	.39	.16	.16	.07	6.73	.43	.18	.17	.06
Chemicals.....	10.78	.63	.29	.28	.06	12.86	.73	.32	.32	.10	13.11	.81	.36	.34	.11
Petroleum.....	16.31	1.38	.72	.53	.13	26.09	1.71	.83	.66	.19	26.17	2.15	1.06	.91	.18
Rubber.....	2.17	.06	.04	.01	.01	1.73	.03	.02	.01	.01	2.30	.06	.03	.02	.01
Other non-durables ⁵	4.78	.04	.01	.01	.02	6.86	.04	.01	.02	.01	6.43	.06	.02	.01	.01
Nonmanufacturing.....	171.77	3.89	1.95	1.36	.29	173.81	3.89	2.19	1.20	.39	195.87	3.68	2.31	1.04	.34
Mining.....	11.38	.51	.15	.27	.10	13.81	.48	.17	.22	.10	15.87	.49	.20	.21	.06
Transportation.....	12.38	.19	.04	.05	.01	12.09	.11	.05	.06	.01	12.87	.13	.05	.06	.01
Railroad.....	4.08	.03	.01	.02	(*)	4.25	.04	.01	.03	(*)	4.40	.06	.04	.03	(*)
Air.....	4.01	.01	.01	(*)	(*)	4.01	.01	(*)	(*)	(*)	4.11	.01	.01	(*)	(*)
Other.....	4.31	.05	.02	.02	.04	3.82	.07	.08	.03	.04	4.36	.06	.03	.03	.01
Public utilities.....	83.96	2.75	1.05	.97	.13	85.44	2.89	1.86	.88	.14	88.27	2.81	1.92	.86	.20
Electric.....	27.85	2.70	1.83	.94	.13	28.12	2.82	1.82	.85	.14	30.24	2.74	1.86	.88	.20
Gas and other.....	6.31	.05	.02	.03	.04	7.32	.07	.04	.02	(*)	8.03	.07	.05	.02	(*)
Trade and services.....	79.25	.19	.00	.04	.04	81.79	.17	.00	.04	.04	88.93	.19	.11	.03	.04
Communication and other ⁶	34.83	.04	.02	.02	.03	34.99	.04	.03	.01	(*)	41.03	.04	.03	.01	.01

*Less than \$5 million.

1. Consists of final estimates taken from the quarterly surveys of total new plant and equipment and, for 1981, plans based on the 1980 fourth-quarter survey taken in late January and February 1981.

2. The 1973 BSA survey did not cover solid waste disposal; estimates of 1973 solid waste expenditures are based on analysis of trends in sample data obtained after 1972.

3. Includes industries not shown separately.

4. Consists of lumber, furniture, instruments, and miscellaneous.

5. Consists of apparel, tobacco, leather, and printing-publishing.

6. Consists of communication; construction; social services and membership organizations; and forestry, fisheries, and agricultural services.

increase to \$10.0 billion in 1981 (table 1). These results are based on a survey in November and December 1980. The proportion of total plant and equipment spending allocated to PA remained at 3.1 percent in 1980; plans for 1981 show no change.

In 1980, shares of PA capital spending for air, water, and solid waste were 55 percent, 36 percent, and 9 percent, respectively. In 1981, plans indicate a small increase in the percentages for air and solid waste, and a small decrease—the fourth consecutive one—in the percentage for water.

Air and water pollution abatement is achieved in two ways—by end-of-line methods and changes-in-production-process methods. The former involve the separation, treatment, or reuse of pollutants after they are generated but before they are emitted from a com-

pany's property. In 1980, businesses allocated 81 percent of capital spending for air and water PA to end-of-line methods; in 1981, they plan to allocate 82 percent (table 2). Alternatively, production processes may be modified or new processes substituted to reduce or eliminate the generation of pollutants. Changes-in-production-process methods entail spending for both PA and other purposes, such as the reduction of production costs, but survey respondents are asked to report only the part of spending that is for pollution abatement. Table 3 shows changes-in-production-process spending by major industry groups.

PA capital spending increased \$0.6 billion in 1980. Petroleum increased spending about \$0.3 billion; electric utilities, chemicals, and motor vehicles each increased spending about \$0.1 bil-

lion. Increases by most other industries were small; several industries reported small decreases. Plans for 1981 indicate the same all-industry increase as in 1980. Petroleum plans to increase spending \$0.4 billion; nonferrous metals, electrical machinery, and chemicals each plan increases of about \$0.1 billion. Petroleum's large increases do not reflect significant increases in the allocation of capital to PA; the proportion of total plant and equipment spending that is for PA decreased in 1980 and, for 1981, plans indicate only a slight increase.

Spending for PA capital in 1980 fell \$0.4 billion short of that indicated by plans one year earlier. Air PA spending fell short \$0.3 billion and water PA spending, \$0.1 billion. Most of the total shortfall was by industries producing durable goods.

Table 2.—New Plant and Equipment Expenditures for Air and

(Billions)

Line		1973			1974			1975			1976		
		Total	Air	Water	Total	Air	Water	Total	Air	Water	Total	Air	Water
1	Total nonfarm business.....	5.54	2.27	1.29	4.21	2.49	1.52	5.33	2.30	2.03	5.47	3.15	2.32
2	Manufacturing.....	2.31	1.48	.85	2.94	1.77	1.14	3.88	2.26	1.61	4.59	2.90	1.69
3	Durable goods.....	1.12	.83	.29	1.20	.91	.29	1.53	1.46	.07	1.46	.84	.62
4	Primary metals ¹.....	.58	.46	.08	.58	.46	.12	.85	.86	.20	.84	.60	.24
5	Basic iron and steel works.....	.14	.10	.04	.20	.18	.02	.40	.24	.16	.42	.24	.17
6	Nonferrous metals.....	.32	.30	.02	.38	.28	.10	.45	.62	.04	.42	.36	.06
7	Fabricated metals.....	.07	.04	.03	.07	.05	.02	.09	.06	.03	.07	.04	.03
8	Electrical machinery.....	.03	.03	.03	.03	.03	.03	.07	.06	.01	.07	.04	.03
9	Machinery, except electrical.....	.04	.03	.03	.06	.03	.03	.07	.04	.03	.07	.04	.03
10	Transportation equipment ².....	.17	.10	.07	.14	.08	.06	.15	.07	.08	.12	.06	.06
11	Motor vehicles.....	.12	.07	.05	.10	.06	.04	.08	.04	.04	.07	.03	.04
12	Aircraft.....	.03	.02	.01	.04	.02	.01	.04	.02	.01	.05	.03	.02
13	Stone, clay, and glass.....	.14	.08	.04	.16	.15	.01	.16	.14	.02	.18	.10	.08
14	Other durables ¹.....	.12	.08	.04	.15	.09	.06	.16	.08	.08	.16	.07	.09
15	Nondurable goods.....	1.19	.62	.57	1.65	.87	.78	2.42	1.17	1.25	1.13	.86	1.17
16	Food including beverages.....	.16	.06	.10	.17	.08	.12	.20	.07	.14	.21	.07	.14
17	Tobacco.....	.03	.01	.02	.04	.02	.02	.04	.02	.02	.04	.01	.03
18	Textiles.....	.28	.16	.12	.36	.24	.12	.46	.25	.21	.41	.14	.27
19	Chemicals.....	.20	.12	.18	.43	.18	.24	.69	.34	.35	.67	.28	.39
20	Petrochemicals.....	.38	.25	.13	.67	.31	.26	.92	.53	.39	.74	.41	.33
21	Rubber.....	.03	.02	.02	.04	.04	.02	.04	.02	.02	.04	.02	.02
22	Other nondurables ¹.....	.02	.01	.01	.04	.03	.01	.04	.02	.02	.02	.01	.01
23	Nonmanufacturing.....	1.25	.82	.44	1.30	.92	.38	1.48	1.45	.03	1.88	1.28	.60
24	Mining.....	.10	.04	.06	.11	.06	.04	.09	.05	.04	.14	.09	.05
25	Transportation.....	.04	.01	.02	.07	.03	.04	.07	.03	.04	.08	.03	.05
26	Railroad.....	.02	(*)	.01	.02	.01	.01	.03	.01	.02	.03	.01	.02
27	Air.....	.01	(*)	(*)	.01	(*)	(*)	.01	(*)	(*)	.01	(*)	(*)
28	Other.....	.01	.01	.01	.04	.01	.02	.03	.01	.02	.04	.01	.03
29	Public utilities.....	.01	(*)	.28	.06	.71	.26	1.18	.83	.29	1.48	1.05	.43
30	Electric.....	.80	.61	.28	.94	.70	.24	1.11	.84	.27	1.46	1.04	.42
31	Gas and other.....	.02	.01	.01	.06	.02	.01	.02	.01	.01	.02	.01	.01
32	Trade and services.....	.15	.09	.06	.11	.08	.04	.14	.10	.04	.14	.09	.05
33	Communication and other ¹.....	.06	.05	(*)	.04	.04	.01	.06	.04	.02	.08	.02	.01

*Less than \$5 million.

1. End-of-line methods involve the separation, treatment, or reuse of pollutants after they are generated but before they are emitted from the firm's property. Changes-in-production-

process estimates for air and water pollution abatement can be derived by subtracting estimates in this table from those in table 1.

2. Includes industries not shown separately.

Price change and real spending

Prices of PA capital goods as measured by the implicit price deflator increased 10 percent in 1980, about the same as in 1979 (table 4). Prices increased 11 percent for air PA capital, 8 percent for water PA, and 12 percent for disposal of solid waste.³

After adjustment for price change, spending for PA capital decreased 1 percent in 1980, compared with a 1-percent increase in 1979. Real spending for air PA increased 2 percent in 1980, water PA decreased 5 percent, and solid waste disposal increased 8 percent. The increase for air PA was substantially less than that indicated by plans one year earlier.

3. For discussion of price information upon which these estimates are based, see Gary L. Rutledge and Betsy D. O'Connor, "Capital Expenditures by Business for Pollution Abatement, 1978, 1979, and Planned 1980," *Survey 60* (June 1980): 19-25. Differences between the deflators shown in that article and those shown here are largely due to the revision of current-dollar estimates of PA capital spending, which affects weights with which price information is combined.

Plans for 1981 indicate a decrease of 1 percent in real spending if prices increase at the same rate as in 1980. Air PA is indicated to decrease 1 percent in 1981, water PA to decrease 3 percent, and solid waste to increase 2 percent.

The size and significance of revisions

Revised estimates of PA capital spending incorporate coverage and statistical improvements. The coverage of certain industries is broadened and

other industries are included for the first time—real estate; professional services; social services and membership organizations; and forestry, fisheries, and agricultural services. Several statistical improvements are made: Company reports received too late for use in previously published estimates are incorporated; company reports are reclassified by industry and size of company to reflect diversification, specialization, expansion, or contraction over time; sample data are reedited to make

Table 3.—New Plant and Equipment Expenditures for Air and Water Pollution Abatement by Changes-in-Production Process Methods

(Billions of dollars)

	1978	1979	1980	1981	1982	1983	1984	1985	Planned 1981
Total nonfarm business.....	1.45	1.49	1.24	1.31	1.34	1.42	1.59	1.65	1.63
Manufacturing.....	.61	.68	.63	.65	.68	.63	.82	.94	1.00
Durables.....	.27	.27	.27	.26	.28	.31	.40	.48	.43
Nondurables.....	.36	.42	.36	.39	.40	.32	.42	.46	.57
Nonmanufacturing.....	.84	.81	.61	.66	.66	.79	.86	.71	.63
Electric utilities.....	.38	.41	.28	.24	.24	.43	.53	.45	.43
Other nonmanufacturing.....	.11	.30	.33	.42	.42	.36	.33	.26	.20

1. Changes-in-production-process methods involve the modification of existing production processes or the substitution of new processes to reduce or eliminate the pollutants generated.

Water Pollution Abatement by End-of-Line Methods¹

of dollars

1977			1978			1979			1980			Planned 1981			Line
Total	Air	Water	Total	Air	Water	Total	Air	Water	Total	Air	Water	Total	Air	Water	
6.86	1.07	2.48	5.88	1.03	2.58	6.13	1.55	2.57	6.88	1.18	2.62	*7.39	1.40	2.58	1
3.48	1.80	1.79	3.29	1.33	1.96	3.47	2.01	1.46	4.08	2.22	1.71	4.70	2.68	2.42	2
1.48	.83	.67	1.32	.84	.47	1.47	.95	.51	1.65	1.10	.55	1.83	1.18	.65	3
.75	.51	.24	.64	.40	.24	.78	.55	.23	.81	.57	.24	.80	.65	.25	4
.42	.25	.17	.37	.24	.13	.57	.39	.18	.56	.38	.18	.59	.43	.16	5
.20	.12	.08	.20	.10	.10	.15	.11	.04	.18	.14	.05	.28	.20	.08	6
.07	.03	.04	.05	.02	.03	.04	.02	.02	.04	.02	.02	.06	.02	.04	7
.06	.04	.04	.07	.03	.04	.07	.03	.04	.00	.05	.04	.15	.06	.07	8
.10	.05	.05	.11	.06	.05	.10	.04	.05	.11	.05	.06	.12	.06	.07	9
.12	.05	.07	.14	.07	.07	.20	.10	.10	.31	.19	.12	.28	.14	.15	10
.06	.02	.05	.10	.05	.05	.14	.08	.06	.25	.18	.06	.21	.10	.11	11
.04	.02	.02	.03	.01	.01	.04	.02	.02	.05	.02	.02	.07	.03	.03	12
.14	.10	.04	.20	.15	.05	.17	.14	.03	.19	.16	.03	.19	.16	.04	13
.14	.08	.06	.11	.06	.05	.11	.07	.04	.10	.06	.05	.11	.07	.04	14
2.69	.85	1.22	1.97	.89	1.09	2.01	1.06	.95	2.37	1.21	1.16	2.87	1.56	1.37	15
.20	.06	.14	.22	.08	.15	.16	.04	.12	.17	.04	.12	.20	.06	.15	16
.04	.01	.03	.02	.01	.01	.04	.01	.02	.09	.01	.02	.06	.02	.03	17
.34	.15	.21	.21	.10	.11	.28	.15	.12	.36	.12	.14	.20	.14	.14	18
.71	.27	.44	.57	.24	.33	.47	.23	.23	.64	.27	.27	.64	.30	.31	19
.73	.35	.38	.85	.40	.45	1.01	.57	.45	1.32	.74	.58	1.67	.93	.74	20
.04	.04	.01	.06	.04	.01	.04	.03	.01	.02	.01	.01	.04	.02	.02	21
.82	.01	.01	.03	.01	.02	.02	.01	.01	.05	.01	.02	.03	.01	.01	22
1.62	1.38	.64	2.31	1.30	1.01	2.65	1.54	1.11	2.78	1.56	.91	2.69	1.93	.77	23
.15	.07	.07	.30	.10	.21	.36	.13	.25	.34	.15	.20	.38	.18	.18	24
.07	.03	.05	.07	.03	.04	.06	.02	.04	.09	.03	.04	.09	.04	.05	25
.03	.01	.03	.02	.01	.03	.03	.01	.02	.03	.01	.03	.05	.01	.03	26
.01	.01	(*)	.01	.01	(*)	(*)	(*)	0	(*)	(*)	0	(*)	(*)	0	27
.03	.01	.02	.02	.01	.02	.03	.01	.02	.04	.02	.02	.04	.02	.02	28
1.80	1.21	.48	1.70	1.10	.60	2.07	1.32	.75	2.25	1.61	.64	2.14	1.53	.61	29
1.87	1.21	.47	1.77	1.09	.68	2.06	1.31	.73	2.23	1.60	.63	2.11	1.51	.60	30
.01	.01	.01	.03	.01	.01	.02	.01	.02	.02	.01	.01	.03	.02	.01	31
.06	.03	(*)	.11	.06	.05	.12	.06	.05	.06	.03	.06	.06	.06	.02	32
.02	.02	(*)	.04	.02	.01	.06	.01	.02	.08	.03	.01	.02	.02	.01	33

3. Consists of lumber, furniture, instruments, and miscellaneous.

4. Consists of apparel, tobacco, leather, and printing-publishing.

5. Consists of communication; construction; social services and membership organizations; and forestry, fisheries, and agricultural services.

each industry as representative of the universe as possible; and sample data and revised estimates of total new plant and equipment spending are used to re-estimate universe spending for PA. (See Technical Note 2 for discussion of the coverage and statistical revisions.) Estimates of PA spending, after these improvements, are consistent with revised estimates of total new plant and equipment spending published in October 1980.⁴

Revisions in PA capital spending at the all-industry level are relatively small for 1974, large for 1979, and moderate for other years. All of the revisions are upward, except for 1973 (tables 5 and 6). Revisions due to coverage improvements are in nonmanufacturing, and are small except in 1978 and 1979 for electric utilities. Revisions due to statistical improvements account

for the largest share of the total revision, except in 1974, and occur in every major industry category.

Actual spending, 1973-79.—For every year except 1977, the revised estimates of PA capital spending show a larger

annual increase than the previously published estimates. The revised average annual increase for 1973-79 is 9 percent, compared with 5 percent previously. In dollar terms, the increase is \$1.6 billion more than previously, about \$1.1

Table 4.—New Plant and Equipment Expenditures for Pollution Abatement in Current and Constant Dollars With Implicit Price Deflators

	1973	1974	1975	1976	1977	1978	1979	1980	Planned 1981
Billions of dollars									
Total.....	4.93	5.78	6.17	7.21	7.34	7.58	8.42	9.28	10.48
Air.....	2.02	2.27	2.02	2.81	3.30	3.91	4.59	5.07	5.57
Water.....	1.60	1.93	2.56	2.97	3.04	2.11	3.21	2.28	3.45
Solid waste.....	.31	.40	.59	.45	.50	.56	.71	.95	.99
Billions of constant (1972) dollars									
Total.....	4.67	4.68	5.16	5.89	4.83	4.64	4.69	4.66	4.68
Air.....	2.79	2.74	2.03	2.84	2.46	3.38	3.60	3.44	2.61
Water.....	1.56	1.60	1.05	2.14	2.06	1.93	1.81	1.72	1.65
Solid waste.....	.32	.34	.29	.35	.33	.33	.38	.41	.42
Implicit price deflators, 1972=100									
Total.....	105.5	124.2	135.8	143.8	151.8	162.3	173.5	187.5	217.4
Air.....	105.9	125.0	137.4	144.5	154.5	164.5	180.2	208.0	222.6
Water.....	105.5	121.0	131.4	158.0	148.4	151.1	177.8	191.2	205.3
Solid waste.....	104.4	120.2	134.8	141.4	152.0	157.9	185.3	209.8	224.0

1. The implicit price deflators for 1980 are based on preliminary source data.

2. Price changes for 1981 are assumed to be the same as in 1980.

4. For details, see George R. Green and Marie F. Hertzberg, "Revised Estimates of New Plant and Equipment Expenditures in the United States, 1947-77," Survey 69 (October 1980): 24-50.

Table 5.—Reconciliation: Previously Published and Revised New Plant and Equipment (P&E) Expenditures for Pollution Abatement (PA)

Year	Previously published P&E for PA for "all industries"	Revisions			Revised P&E for PA for total nonfarm business
		Total	Coverage ¹	Statistical	
1973	5.24	-0.32	0.08	-0.36	4.93
1974	5.62	.08	.07	.04	5.78
1975	6.55	.42	.06	.65	6.97
1976	6.76	.47	.07	.40	7.23
1977	6.94	.40	.18	.22	7.34
1978	6.92	.85	.24	.42	7.58
1979	7.14	1.28	.41	.87	8.42

1. Consists of estimates for previously omitted portions of industries and for real estate; professional services; social services and membership organizations; and forestry, fisheries, and agricultural services.

billion for manufacturing and \$0.5 billion for nonmanufacturing. (See Technical Note 8 for a comparison of estimates for manufacturing.)

On the revised basis, the proportion of plant and equipment spending allocated to PA is less than, but follows a trend similar to that, in the previously published series (table 7). The proportion peaks in 1975 and then decreases, largely reflecting trends for air and water PA. Air and water PA peak in 1975 and 1976, respectively, and then

decrease steadily through 1979.⁵ The revised proportions are less than those previously published because coverage improvements added little to PA capital spending but substantially to total plant and equipment spending, and because statistical improvements increased the weights for industries with small proportions of PA.

The revised and previously published shares of capital spending for air PA, water PA, and solid waste disposal are roughly similar. For example, the air share is largest in 1973 and generally

5. For an analysis of the relationship between trends in air and water PA proportions and regulatory deadlines, see Gary L. Rutledge, Frederick J. Dreiling, and Betsy C. Dunlap, "Capital Expen-

ditures by Business for Pollution Abatement, 1973-77 and Planned 1978," Survey 56 (June 1978, part 1): 33-38.

decreases through 1978 in both revised and previously published series. The 1973-79 average share for air (55 percent) is slightly smaller than previously, for water (38 percent) is slightly larger, and for solid waste (7 percent) is about the same.

As in current dollars, percentage changes in revised real spending are larger than previously indicated, except for 1977. For 1973-79, the average annual increase is less than 0.1 percent, compared with an average annual decrease of 4 percent previously indicated. However, several trends are the same. Capital spending for air PA, after increasing in 1975, decreases through 1978 for both series, and capital spending for water PA peaks in 1976 and decreases thereafter.

Planned spending, 1974-80.—Estimates of planned PA capital spending were revised in the same way as estimates of actual spending. As for estimates of actual spending, the revised planned levels of spending and percent changes in them are generally larger than those previously published.

Estimates of planned PA capital spending are reasonably accurate indicators of actual spending, as indicated

Table 6.—Sources of Revisions of New Plant and Equipment Expenditures: Total and for Pollution Abatement (PA)

	1973		1974		1975		1976		1977		1978		1979	
	Total	PA	Total	PA	Total	PA	Total	PA	Total	PA	Total	PA	Total	PA
Total nonfarm business	37.95	-4.22	44.58	6.88	44.35	6.42	50.95	0.47	52.24	4.46	77.43	6.66	83.37	1.28
Coverage ¹	25.81	.06	28.94	.07	28.28	.06	30.76	.07	35.88	.13	41.82	.24	46.80	.41
Statistical	11.03	-3.85	15.64	.01	16.00	.35	20.20	.40	16.45	.22	35.60	.42	47.07	.87
Manufacturing	4.56	-.21	7.20	.08	8.07	.45	7.46	.45	8.06	.38	12.10	.49	16.76	.85
Coverage	1.48	0	1.68	0	1.32	0	1.52	0	3.24	0	2.60	0	2.91	0
Statistical	3.07	-.21	5.52	.08	6.75	.45	5.94	.45	4.82	.38	9.50	.49	13.85	.85
Durables	3.49	-.19	4.82	-.03	4.48	.12	4.88	.22	6.27	.12	8.77	.17	12.34	.42
Coverage	1.48	0	1.68	0	1.32	0	1.52	0	3.24	0	2.60	0	2.91	0
Statistical	2.00	-.19	3.19	-.03	3.17	.12	3.36	.22	3.03	.12	6.17	.17	9.43	.42
Nondurables	.86	-.02	2.38	.11	2.48	.33	2.57	.23	2.79	.26	3.32	.31	4.42	.43
Coverage	.86	-.02	2.38	.11	2.48	.33	2.57	.23	2.79	.26	3.32	.31	4.42	.43
Statistical	.86	-.02	2.38	.11	2.48	.33	2.57	.23	2.79	.26	3.32	.31	4.42	.43
Nonmanufacturing	32.60	-.11	37.38	(*)	37.95	-.08	43.49	.82	44.18	.08	65.33	.16	76.60	.43
Coverage	24.82	.06	28.94	.07	28.28	.06	30.76	.07	35.88	.13	41.82	.24	46.80	.41
Statistical	8.78	-.17	18.44	-.07	19.67	.02	12.73	.75	8.30	-.05	23.51	-.07	29.80	.03
Electric utilities	-.94	-.21	-.90	-.15	-.33	-.18	-.05	-.23	.64	-.14	-.16	-.12	.15	-.02
Coverage	.79	.02	1.13	.43	1.81	.43	2.27	.04	3.24	.18	3.34	.20	3.44	.27
Statistical	-1.73	-.23	-2.12	-.18	-2.16	-.21	-2.32	-.23	-2.60	-.28	-3.40	-.28	-3.29	-.28
All other	34.64	.11	38.87	.15	38.31	.16	43.54	.24	44.18	.17	65.49	.26	76.45	.44
Coverage	24.82	.06	28.94	.07	28.28	.06	30.76	.07	35.88	.13	41.82	.24	46.80	.41
Statistical	10.82	.05	19.93	.11	20.03	.11	12.78	.17	8.30	.04	23.67	.02	29.65	.03

*Less than \$5 million.

1. Consists of estimates for previously omitted portions of industries and for real estate; professional services; social services and membership organizations; and forestry, fisheries, and agricultural services.

Table 7.—Pollution Abatement as a Percentage of Total New Plant and Equipment Expenditures

Year	Previously published	Revised
1973	5.2	3.6
1974	5.4	3.6
1975	3.5	4.4
1976	5.0	4.2
1977	5.1	3.7
1978	4.9	3.3
1979	4.1	3.1

by planned spending as a percentage of actual spending (tables 8 and 9). Except for 1979, the percentages on a revised basis are roughly similar to those on a previously published basis. The mean absolute percentage deviation between actual and planned spending for 1974-79 on a revised basis is 7.5 percent, compared with 8.4 percent previously.

Table 10.—Ratio of BEA Estimates to Census Bureau Estimates for Manufacturing

Year	Previously published	Revised
1973	1.41	1.33
1974	1.18	1.21
1975	1.23	1.25
1976	1.34	1.37
1977	1.22	1.32
1978	1.19	1.34
1979	1.10	1.34

Technical Notes

1. Survey Methodology

The BEA plant and equipment survey collects quarterly data on nonfarm business investment and related series four times each year. Additional annual data are obtained in a fifth survey collected in November and December. This fifth survey, often referred to as the annual survey, includes questions on spending for air and water PA and solid waste disposal. BEA sends the annual survey to about 13,000 companies, about 2,000 less than for the quarterly surveys, and the response rates for the annual survey is lower. However, for industries where spending for PA is concentrated, the sample represents a large percentage of total universe spending.

Universe estimates of PA capital spending

Company reports from the annual survey are grouped by industry and size. Sample ratios of PA to total plant and equipment spending are derived for each PA category (e.g., air end-of-line) and industry size group. To estimate actual PA spending at the universe level, the sample ratios are multiplied by the sum of universe estimates of actual plant and equipment spending from the quarterly surveys. To estimate planned PA spend-

ing, the sample ratios are multiplied by the estimates of planned plant and equipment spending that are derived from the fourth-quarter survey and published each March.⁷

In deriving planned PA spending, systematic bias is removed. Systematic bias is that portion of the deviation of planned spending from actual spending assumed to be due to factors other than changes in economic and operating conditions. Because the PA

7. For previously published PA estimates, the sample ratios were applied to different total plant and equipment data. For actual PA expenditures, actual spending for the first three quarters and plans for the fourth quarter were used. For planned PA spending, data from the annual survey were used.

spending series is relatively short, bias correction factors from the total plant and equipment spending estimates are used to adjust PA spending.⁸ For example, if total planned plant and equipment spending for an industry is decreased by 1 percent to remove systematic bias, then PA spending for it is also decreased by 1 percent.

The mean absolute percent deviation between planned and actual spending for 1974-80 was lowered from 9.8 percent to 7.1 percent by use of this bias adjustment procedure. Use of PA correction factors, on which work is in

(Continued on page 30)

8. For a discussion of how correction factors are derived for the total plant and equipment spending series, see Green and Hertzberg, "Revised Estimates," p. 31.

9. For a discussion of the plant and equipment surveys, see Green and Hertzberg, "Revised Estimates," pp. 32-33.

Table 8.—New Plant and Equipment Expenditures for Pollution Abatement: Planned Expenditures as a Percentage of Actual Expenditures

Year	Previously published	Revised
1974	123.6	126.8
1975	96.1	95.1
1976	106.6	105.3
1977	108.2	108.8
1978	103.3	102.8
1979	102.3	97.2
1980		104.8

Table 9.—New Plant and Equipment Expenditures for Pollution Abatement: Planned Expenditures as a Percentage of Actual Expenditures, by Industry

	Total nonfarm business	Manufacturing			Nonmanufacturing		
		Total	Durables	Non durables	Total	Electric utilities	All other
1974: Total	120.6	123.8	125.6	122.5	114.3	106.5	130.2
Air	124.3	120.1	120.8	128.5	115.4	110.6	132.1
Water	119.6	123.1	123.6	122.9	112.0	100.8	137.1
Solid waste	94.1	81.3	83.6	80.0	114.9	124.5	183.9
1975: Total	90.1	91.9	90.7	98.0	107.7	102.0	122.4
Air	97.3	92.3	96.3	87.1	109.4	104.3	128.4
Water	92.9	105.6	106.3	92.8	108.4	92.8	126.7
Solid waste	90.4	82.0	85.9	95.6	110.7	132.8	98.6
1976: Total	105.3	100.6	105.5	97.8	114.8	117.5	187.3
Air	103.7	95.5	103.3	96.0	110.5	115.9	90.1
Water	107.5	103.4	100.2	101.3	119.1	119.7	118.0
Solid waste	104.4	98.2	108.7	81.3	133.6	125.9	142.4
1977: Total	108.8	110.8	116.9	107.1	105.2	104.7	107.7
Air	105.1	106.3	111.3	107.7	99.7	96.3	103.2
Water	112.2	112.1	127.8	106.5	109.8	122.4	103.1
Solid waste	115.0	104.8	98.7	107.9	122.1	131.2	133.3
1978: Total	183.8	105.2	113.3	100.0	101.3	106.3	91.4
Air	182.2	97.0	101.8	93.6	106.2	112.8	92.2
Water	161.2	113.3	135.7	183.3	88.4	94.1	75.6
Solid waste	117.7	115.3	112.5	117.1	128.2	90.7	151.4
1979: Total	97.3	100.1	102.2	98.8	93.8	94.1	90.8
Air	95.6	96.2	98.1	96.3	92.2	93.5	86.2
Water	100.8	104.0	106.8	102.2	98.9	94.9	103.4
Solid waste	90.5	95.9	117.0	94.5	93.7	102.8	57.9
1980: Total	104.6	108.2	115.6	180.3	90.7	92.4	116.9
Air	100.4	109.7	114.3	183.2	103.1	97.9	122.5
Water	100.7	107.3	128.2	85.0	97.4	87.8	121.6
Solid waste	98.0	104.3	130.5	94.4	91.1	70.6	108.5

1. Planned expenditures are corrected for systematic biases. Procedures for bias correction are described in the technical notes.

Table 6.—Expenditures for New Plant and Equipment by U.S. Nonfarm Business¹

(Billions of dollars)

	1979	1980	1981 ¹	Seasonally unadjusted								Seasonally adjusted at annual rates							
				1980				1981				1980				1981			
				I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Total nonfarm business.....	278.44	296.53	328.51	65.28	74.82	74.12	52.31	61.74	75.48	80.39	81.86	297.63	294.36	296.25	297.56	312.24	317.37	323.88	325.09
Manufacturing.....	98.68	115.81	127.85	24.10	28.55	28.96	23.57	26.98	36.51	32.26	35.22	151.77	155.48	158.49	162.83	174.59	171.96	176.55	175.46
Durable goods.....	81.67	98.31	108.99	12.54	14.79	14.49	17.89	13.24	16.12	16.02	15.76	58.75	59.38	58.19	59.77	61.24	60.28	64.36	65.05
Primary metals ²	6.76	7.71	8.40	1.00	1.92	2.07	2.18	1.80	1.94	2.21	2.05	7.88	7.84	8.02	7.17	7.94	7.95	8.03	8.08
Blast furnaces, steel works.....	2.06	3.29	3.36	.73	.85	.84	.85	.55	.75	.88	1.06	2.74	3.58	3.29	2.80	2.56	3.14	3.28	3.41
Nonferrous metals.....	2.36	3.11	3.74	.61	.72	.85	.08	.74	.87	1.01	1.13	2.82	2.91	3.49	3.18	3.43	3.52	4.01	3.88
Fabricated metals.....	8.05	2.94	2.99	.67	.75	.76	.75	.82	.71	.73	.94	3.14	2.97	3.06	2.72	2.92	2.78	2.93	3.30
Electrical machinery.....	7.28	9.59	11.07	1.32	2.21	2.35	3.20	2.05	2.42	3.77	3.55	8.88	9.28	9.97	10.10	9.79	10.19	11.80	12.06
Machinery, except electrical.....	10.82	11.59	13.06	2.45	2.57	2.76	3.42	2.80	3.19	3.84	3.83	11.86	11.81	11.05	12.86	12.86	12.18	13.50	13.93
Transportation equipment ³	18.82	18.18	18.78	3.69	4.73	4.47	5.07	4.12	4.81	4.64	5.43	18.06	18.50	17.54	18.95	18.95	17.99	18.34	18.58
Motor vehicles.....	8.80	9.08	9.68	2.80	2.40	2.21	2.46	2.23	2.48	2.43	2.56	8.98	9.08	8.88	9.35	10.09	9.38	9.73	9.67
Aircraft.....	6.37	7.08	6.91	1.40	1.79	1.73	2.46	1.46	1.68	2.13	2.13	7.35	7.44	6.70	8.78	6.96	6.75	8.67	7.25
Stone, clay, and glass.....	3.94	3.82	3.47	.98	1.01	1.00	1.00	.75	.85	.91	1.05	4.06	3.91	3.74	3.81	3.81	3.29	3.40	3.65
Other durables ⁴	4.22	5.09	6.13	1.89	1.33	1.70	1.44	1.29	1.50	1.59	1.86	4.64	5.45	4.81	5.22	5.78	5.97	8.30	8.04
Nonmanufacturing.....	179.77	178.81	199.52	41.08	45.15	45.13	38.44	42.85	47.89	48.14	53.74	138.18	172.66	179.63	180.85	187.74	189.88	192.42	199.64
Mining.....	11.88	18.51	18.91	2.74	3.37	3.50	4.01	3.69	4.06	4.40	4.76	11.89	12.81	13.88	15.28	16.28	15.99	17.41	17.87
Transportation.....	12.35	12.06	12.14	2.73	3.31	3.00	3.05	2.83	3.08	2.87	3.88	12.47	12.05	12.23	11.70	11.74	11.48	11.58	13.71
Railroad.....	4.93	4.25	4.39	1.59	1.06	1.00	1.20	.96	1.03	1.10	1.29	4.45	4.06	3.98	4.24	4.23	4.30	4.41	4.81
Air.....	4.01	4.01	3.65	.90	1.37	.94	.91	.88	.84	.71	1.12	3.99	4.27	4.08	3.77	3.95	3.17	3.09	4.55
Other.....	4.31	3.82	4.10	.94	.98	1.07	.94	.74	1.07	1.06	1.22	4.11	4.76	4.18	2.89	3.46	4.21	4.07	4.36
Public utilities.....	33.95	35.44	37.25	8.01	8.34	8.97	8.82	7.43	8.36	9.65	10.30	35.25	35.82	35.88	34.88	36.05	37.39	38.28	37.51
Electric.....	27.65	28.12	28.93	6.47	7.07	8.39	7.59	5.85	7.29	7.42	7.86	28.95	27.91	28.14	27.94	27.69	28.95	30.26	28.78
Gas and other.....	6.31	7.32	8.32	1.54	1.27	2.06	2.18	1.58	2.07	2.23	2.44	7.28	7.91	7.74	7.41	8.36	8.40	7.96	8.87
Trade and services.....	79.25	81.78	88.22	19.03	20.28	20.34	22.09	18.41	21.12	20.92	23.77	82.17	81.07	81.10	82.91	88.43	94.55	94.12	99.25
Wholesale and retail trade.....	22.61	21.78	22.61	5.29	5.84	5.45	5.47	4.78	5.25	5.25	5.88	22.54	22.26	22.45	20.23	20.57	20.57	20.57	20.57
Finance, insurance, and real estate.....	29.63	31.84	31.84	7.81	7.77	7.38	8.06	7.02	7.84	7.84	8.06	31.54	30.52	31.82	30.55	32.53	32.53	32.53	32.53
Personal, business, and prof. services.....	27.02	28.08	28.08	6.49	6.92	7.03	7.94	7.00	7.00	7.00	7.00	28.28	28.97	27.94	29.11	30.06	30.06	30.06	30.06
Communication and other.....	54.82	56.89	61.09	8.52	9.22	9.25	8.67	8.28	10.28	10.30	11.28	57.84	57.96	58.97	59.11	60.32	60.54	60.97	62.42
Communication.....	28.75	30.16	30.16	6.04	6.77	6.90	6.78	6.50	7.84	7.84	8.06	28.81	28.78	28.82	28.98	28.98	28.98	28.98	28.98
Other ⁵	11.05	10.63	10.63	2.48	2.75	2.68	2.91	2.78	2.44	2.46	2.44	10.54	10.66	10.60	11.23	11.44	11.44	11.44	11.44

1. Estimates are based on planned capital expenditures reported by business in late April and May 1981. The planned expenditures for 1981 have been corrected for biases. The adjustment procedures are described in the October 1980 Survey. Before adjustment, plans for 1981 were \$356.71 billion for total business, \$130.87 billion for manufacturing, and \$196.86 billion for nonmanufacturing.

2. Includes industries not shown separately.

3. Consists of lumber, furniture, instruments, and miscellaneous.

4. Consists of apparel, tobacco, leather, and printing-publishing.

5. Consists of construction; social services and membership organizations; and forestry, fisheries, and agricultural services.

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progress, may further lower the deviation between planned and actual spending.

2. Coverage and Statistical Revisions

The PA capital expenditures series now covers all nonfarm business in the United States. Coverage was expanded by including expenditures for previously omitted portions of industries (see Green and Hertzberg, "Revised Estimates," p. 38) and for four industries previously not included—real estate; professional services; social services and membership organizations; and forestry, fisheries, and agricultural services. Coverage revisions for PA capital expenditures increased from less than \$0.1 billion in 1978 to \$0.4 billion in 1979 (table 6).

Most of the additional coverage in PA expenditures is derived from nonsample sources. The only sample incorporated for the first time in this revision is for real estate, hospi-

tals, and educational services. For the remaining industries or portions of industries, only Rural Electrification Administration (REA) electric utility cooperatives have sizable PA capital expenditures; other industries' PA expenditures are insignificant relative to their total plant and equipment expenditures. For REA electric utility cooperatives, it is assumed that PA capital spending as a percentage of capital spending for generating facilities is equal to the corresponding percentage for corporate utilities. The estimates of PA capital spending for these cooperatives increase rapidly from 1977 through 1978, reflecting a rapid increase in the construction of generating facilities. In earlier years, the main activities of these cooperatives were transmission and distribution—activities not involving pollution abatement.

Statistical revisions in PA capital spending resulted in a decrease for 1973 and increases for all other years. These revisions were due to both the statistical revisions in total uni-

verse plant and equipment spending and to retabulation of PA data from the sample reports from the annual survey.

Statistical revisions in total plant and equipment spending increased from \$11.7 billion in 1973 to \$47.1 billion in 1978. These revisions were due to the incorporation of benchmark data for 1967 and 1972 and to retabulation of the quarterly sample reports. Before retabulation, each company's industry- and size-group classification was reviewed and made to reflect major mergers and acquisitions occurring after 1972, responses received too late for inclusion in the previously published estimates were included, and the responses were reedited (see Green and Hertzberg, "Revised Estimates," pp. 26-28).

The reports from the annual survey were also retabulated. Before retabulation, the steps listed for the quarterly surveys were followed. Reclassification of companies and reediting of responses had the largest effect

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First-quarter profits of manufacturers of nondurables other than petroleum increased sharply, surpassing their previous peak. The increase occurred in almost all nondurable manufacturing industries. Profits of durable goods manufacturers increased, but remained far below their peaks. Motor vehicle manufacturers, which accounted for about one quarter of durable manufacturers' profits at their peak in the first quarter of 1979, swung to losses in the third quarter of 1979. Losses increased in the first quarter of 1981, reflecting lower output of autos and trucks as well as the costs of rebate programs.

Profits of trade corporations increased sharply in the first quarter, as did profits of transportation corporations. Within transportation, profits of trucking and railroad corporations increased reflecting increased volumes of freight carried; losses of airlines decreased, reflecting sharp increases in fares which offset a decline in revenue-passenger miles.

* * *

First-quarter NIPA revisions

The 75-day revision of the national income and product account estimates for the first quarter of 1981 are shown in table 5.

Table 5.—Revisions in Selected Component Series of the NIPA's, First Quarter of 1981

	Seasonally adjusted at annual rates			Percent change from preceding quarter at annual rates		
	45-day estimate	75-day estimate	Revision	45-day estimate	75-day estimate	Revision
Billions of current dollars						
GNP.....	2,853.5	2,853.5	-0.5	18.3	18.2	-0.1
Personal consumption expenditures.....	1,505.5	1,510.1	4.3	13.1	14.5	1.1
Nonresidential fixed investment.....	316.1	315.8	-.3	19.9	19.6	-.3
Residential investment.....	116.7	116.7	0	13.7	14.0	.3
Change in business inventories.....	2.6	4.5	1.9			
Net exports.....	37.0	29.2	-7.8			
Government purchases.....	575.5	576.5	1.0	22.7	13.5	-8.8
Federal.....	221.5	221.4	-.1	19.0	19.3	.3
State and local.....	354.1	354.9	.8	8.9	10.0	1.1
National income.....	2,283.5	2,291.1	7.6	16.4	16.6	.2
Compensation of employees.....	1,721.9	1,722.4	.5	15.3	15.4	.1
Corporate profits with inventory valuation and capital consumption adjustments.....	202.6	208.0	5.4	48.4	50.6	2.2
Other.....	264.3	265.7	1.4	5.8	6.6	.8
Personal income.....	2,318.5	2,319.5	1.0	11.6	11.5	-.1
Billions of constant (1972) dollars						
GNP.....	1,535.0	1,535.4	.4	5.4	5.4	.2
Personal consumption expenditures.....	859.3	860.2	.9	5.0	4.8	-.2
Nonresidential fixed investment.....	172.0	169.0	-3.0	13.3	13.3	0
Residential investment.....	80.8	80.0	-.8	2.0	2.0	0
Change in business inventories.....	-2.3	-1.4	.9			
Net exports.....	23.9	20.9	-3.0			
Government purchases.....	292.2	293.6	1.4	4.8	5.4	.6
Federal.....	111.0	111.2	.2	14.3	14.8	.5
State and local.....	181.2	182.4	1.2	-1.5	.2	1.7
Index Numbers, 1972=100						
GNP implicit price deflator.....	185.25	185.14	-.11	30.0	0.6	-.3
GNP fixed-weighted price index.....	794.4	794.4	0	30.2	30.2	0
GNP chain price index.....				9.1	9.8	.7

1. Not at annual rates.

NOTE.—For the first quarter of 1981, the following revised or additional major source data became available: for personal consumption expenditures, revised retail sales for March; consumer share of new car purchases for March; and consumption of electricity for February; for nonresidential fixed investment, revised manufacturers' shipments of equipment for March; revised construction put in place for March; business share of new car purchases for March; and business expenditures for plant and equipment for the quarter; for residential investment, revised construction put in place for

March; for change in business inventories, revised book values for manufacturing and trade for March; for net exports of goods and services, revised merchandise trade for March; and revised service receipts for the quarter; for government purchases of goods and services, revised construction put in place for March; for wages and salaries, revised employment, average hourly earnings and average weekly hours for March; for net interest, revised net interest received from abroad for the quarter; for corporate profits, domestic book profits for the quarter; revised profits from the rest of the world for the quarter; and for GNP prices, revised residential housing prices for the quarter.

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on the ratios of PA to total plant and equipment spending. In editing, which is the process of examining the company responses with the aim of making them as representative of the universe as possible, companies that have unusual PA investment patterns are often treated separately in calculating sample ratios to minimize their effect on the universe estimates.

The only downward statistical revision—in 1973—reflects revisions for electric utilities, petroleum, chemicals, nonferrous metals, and iron and steel. The downward revision in these five industries reflects, in turn, downward revisions in their total plant and equipment spending as well as reediting of responses and

reclassification of reports. Because 1973 was the first year PA questions were included on the annual survey, determining whether company responses were representative of the universe was difficult at that time. Reediting and reclassification resulted in improved determinations for several industries.

3. Comparison of BEA and Census Bureau Estimates for Manufacturing

Alternative estimates of capital expenditures for pollution abatement are available for manufacturing from the Pollution Abatement Costs and Expenditures Survey by the Census Bureau. BEA estimates are larger than Census Bureau estimates in all years. The revision makes the ratios of BEA to Census

estimates more stable and increases them in each year except 1973 (table 10). For 1973-79, the average annual increase for BEA revised estimates is 5 percent and for the Census Bureau estimates is 7 percent.

The differences in the estimates are not surprising in light of differences in the underlying surveys. The Census Bureau sends questionnaires to parts of companies called establishments, excluding establishments in nonmanufacturing. BEA sends questionnaires to companies; the resulting manufacturing estimates include nonmanufacturing establishments owned by manufacturing companies but exclude nonmanufacturing establishments owned by nonmanufacturing companies. Sampling methods, sample sizes, and extrapolation procedures also differ.